

NON-PUBLIC?: N
ACCESSION #: 9512190230
LICENSEE EVENT REPORT (LER)

FACILITY NAME: South Texas, Unit 2 PAGE: 1 OF 4

DOCKET NUMBER: 05000499

TITLE: Reactor trip and turbine trip due of loss of
generator excitation
EVENT DATE: 11/15/95 LER #: 95-008-00 REPORT DATE: 12/14/95

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Scott M. Head - Sr. Consulting TELEPHONE: (512) 972-7136
Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: TL COMPONENT: EXC MANUFACTURER: W120
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On November 15, 1995, Unit 2 was in Mode 1 at 100% power. At approximately 0702 hours, Unit 2 experienced a reactor trip due to a main turbine trip after loss of generator excitation. At the time of this occurrence, reactor power was being lowered in response to a turbine generator exciter voltage increase to over 150 volts and failure of a number of exciter circuitry fuses. The cause of this event was a sudden degradation of the rectifier diodes and rectifier fuses in the main generator exciter resulting in an actuation of the loss of generator excitation relays. Corrective actions include replacement of all exciter rectifier diode/fuse modules, inspection of the Unit 1 turbine generator for any similar turbine generator exciter degradation problems, and preventive maintenance enhancements based on lessons learned from this event.

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END OF ABSTRACT

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DESCRIPTION OF EVENT:

On November 15, 1995, Unit 2 was in Mode 1 at 100% power. At approximately 0702 hours, Unit 2 experienced a reactor trip due to a main turbine trip after loss of generator excitation.

On November 14, 1995, at approximately 1800 hours, an increase in main turbine generator exciter field output voltage of approximately 15 volts occurred with no change in the main turbine generator output voltage or current. A visual diode fuse inspection of the exciter circuitry was completed at approximately 0236 hours on November 15, 1995. The inspection results indicated 15 diode fuses had opened. Further inspection was completed at approximately 0430 hours on November 15, 1995 to determine the number of blown fuses per phase. Since generator exciter voltage and current had remained essentially stable from approximately 1800 hours on November 14, 1995, a decision was made to wait for essential personnel to arrive on site during the morning hours of November 15, 1995 so a plan could be developed to address the exciter problem.

On November 15, 1995, at approximately 0645 hours, generator exciter output voltage increased to over 150 volts. Steps were taken to lower reactor power. While reactor power was being lowered, loss of generator excitation relays actuated to protect the main generator which in turn actuated the lockout relay. The lockout relay caused the main turbine to trip. The reactor tripped from a main turbine trip with reactor power greater than 50 percent.

CAUSE OF EVENT:

The cause of this event was a degradation of several rectifier diodes and fuses in the main generator exciter resulting in an actuation of the loss of generator excitation relays.

Although not a cause of this event, lessons learned from this occurrence resulted in corrective actions that will be used to improve response should similar generator exciter indications occur in the future.

ANALYSIS OF EVENT:

Reactor trips are reportable pursuant to 10CFR50.73 (a)(2)(iv). Lo-Lo Steam Generator levels were received on all four Steam Generators following the Reactor trip. This resulted in an Engineered Safety Features actuation of the Auxiliary Feedwater System and Main Feedwater isolation which is expected with a Reactor trip from high power levels. All systems functioned as designed. There were no adverse safety or radiological consequences of this event.

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CORRECTIVE ACTIONS:

1. All rotating rectifier modules in the generator exciter were replaced using new rectifier modules. New style diode fuses were used in the new rectifier modules.
2. The main components of the generator exciter were tested satisfactorily.
3. The generator exciter voltage regulator was tested satisfactorily.
4. The calibration of the generator exciter voltage and current indicating meters was checked and found satisfactory.
5. The Unit 1 generator exciter diode fuses were inspected and found satisfactory.
6. An evaluation will be completed by May 1996 for a need to replace generator rectifier diode fuses on a periodic basis.
7. A analysis of selected failed diode modules will be performed by March 1996 in an attempt to identify a root cause of failure.
8. Guidance was issued to Operations, Maintenance and Engineering concerning vendor information on the operating capability of the generator exciter and recommendations for operating the generator exciter under adverse conditions.
9. Generator exciter preventive maintenance activities will be revised by March 1996 with relevant information concerning degraded rectifier diode and fuse conditions and recommended actions for open fuses.

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ADDITIONAL INFORMATION:

The most probable cause of the generator exciter diode fuse failures was thermal aging and cyclic fatigue. The generator exciter fuses were inspected in October 1995 during a refueling outage and no indications of an impending failure existed. A routine maintenance check, consisting of a visual inspection of these fuses, conducted on November 8, 1995 found the fuses intact and acceptable for operation. The first indication of a generator exciter problem was on November 14, 1995.

Industry and vendor information indicate generator exciter diode fuses weaken from thermal aging and cyclic aging over a long period of operation. The degradation process is very gradual and internal component damage is extremely difficult to recognize. Exciter fuse failure is usually detected by either visually inspecting the diode fuses or by observing the exciter voltage and current meter indications. A review of computer data indicated exciter voltage was fluctuating by approximately 7 volts two days prior to the generator exciter field output voltage increase that occurred on November 14, 1995. This information indicates the generator exciter diode fuse failures was most probably due to gradual degradation.

A review of Nuclear Plant Reliability Data System information revealed two occurrences of generator exciter failure in the industry. One failure was caused by a shorted exciter armature coil and the other failure was caused by excessive humidity within the exciter housing. Both failures resulted in the loss of several exciter rectifier modules and fuses.

Both Unit 1 and Unit 2 generator exciters have operated without the loss of any diode fuses for the past three years.

There were no previous events reported by the South Texas Project to the Nuclear Regulatory Commission within the last three years regarding a reactor trip and turbine trip due to loss of generator excitation.

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The Light

company South Texas Project Electric Generating
Houston Lighting & Power Station P. O. Box 289 Wadsworth, Texas 77483

December 14, 1995
ST-HL-AE-5248
File No.: G26
10CFR50.73

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project
Unit 2
Docket No. STN 50-499
Licensee Event Report 95-008
Reactor Trip and Turbine Trip due to Loss of Generator Excitation

Pursuant to 10CFR5 0.73, South Texas Project submits the attached
Unit 2 Licensee Event Report 95-008 regarding a reactor trip and turbine
trip due to loss of generator excitation. This event did not have an
adverse effect on the health and safety of the public.

If you should have any questions on this matter, please contact Mr.
S. M. Head at (512) 972-7136 or me at (512) 972-7988.

R. E. Masse
Unit 2 Plant Manager

KJT/lf

Attachment: LER 95-008 (South Texas, Unit 2)

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Project Manager on Behalf of the Participants in the South Texas Project

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South Texas Project Electric Generating Station File No.: G26
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c:

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*** END OF DOCUMENT ***
